Institutions and diversification: Related versus unrelated diversification in a varieties of capitalism framework

Institutions and Diversification: Related versus Unrelated Diversification in a Varieties of Capitalism framework

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Ron Boschma#* and Gianluca Capone[+]

CIRCLE, Lund University
* URU, Utrecht University
[+] IUSS, Pavia

Abstract
The Varieties of Capitalism literature has drawn little attention to industrial renewal and diversification, while the related diversification literature has neglected the institutional dimension of industrial change. Bringing together both literatures, the paper proposes that institutions have an impact on the direction of the diversification process, in particular on whether countries gain a comparative advantage in new sectors that are close or far from what is already part of their existing industrial structure. We investigate the diversification process in 23 developed countries by means of detailed product trade data in the period 1995-2010. Our results show that relatedness is a stronger driver of diversification into new products in coordinated market economies, while liberal market economies show a higher probability to move in more unrelated industries: their overarching institutional framework gives countries more freedom to make a jump in their industrial evolution. In particular, we found that the role of relatedness as driver of diversification into new sectors is stronger in the presence of institutions that focus more on 'non-market' coordination in the domains of labor relations, corporate governance relations, product market relations, and inter-firm relations.

JEL codes: B52, L16, O43, P16, P51

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1. Introduction

Institutions play a crucial role in market economies, because they help firms to solve complex coordination problems with other economic actors in the labor market (Freeman, 2007), the financial market (La Porta et al., 1998) and the product market (Nicoletti et al., 2000). Over the last 15 years, a literature summarized under the label of Varieties of Capitalism (Hall and Soskice, 2001) has investigated the existence and persistence of different institutional arrangements across developed countries. The Varieties of Capitalism (VoC) approach claims that the institutional framework in a country determines its pattern of economic and technological specialization. Coordinated market economies (CME's), where firms rely on more lasting, non-market relations, would specialize in incremental innovations – and in sectors where incremental innovations prevail, as CME's are more characterized by specific assets that cannot be readily put to other use. Liberal market economies (LME's), where firms coordinate their activities through hierarchies and market arrangements, would specialize in radical innovations – and in sectors where radical innovations prevail, because they are characterized by generic assets (Hall and Soskice 2001).

Empirical studies have found mixed support for these claims (Taylor, 2004; Allen et al., 2006; Akkermans et al., 2009; Meelen, 2013). Other deficiencies of the VoC literature are the use of only two predefined institutional categories (LME and CME) (Geffen and Kenyon, 2006) that do not necessarily fit with mixed market economies (Schneider and Paunescu, 2012) or emerging market economies (Kumar et al., 2013), the neglect of inefficiencies and tensions that might exist within institutional systems rather than complementarities (Crouch, 2005; Jessop, 2011), the ignorance of regional varieties within the same institutional system (Asheim and Coenen, 2006; Gertler, 2010), and a preoccupation with institutional stability rather than change (Deeg and Jackson, 2007). These critiques have led to intense debates and stimulated further developments in the VoC framework, like a more explicit focus on institutional dynamics (Hall, 2007; Hall and Thelen 2009). In the paper, we criticize another aspect of the overly static nature of the VoC approach, like the claim that institutions determine the outcomes of the innovation process, and in particular, whether countries have more

success in radical or incremental innovations (Hall and Soskice, 2001). Little attention has been drawn in the VoC literature to the question whether the institutional framework of countries affects economic renewal and particular patterns of industrial diversification.

Within the field of evolutionary economic geography, there is an expanding literature that investigates the intensity and nature of industrial diversification (Boschma and Frenken, 2011). These studies show that countries (Hausmann and Klinger, 2007) and regions (Neffke et al., 2011; Boschma et al., 2013; Essletzbichler, 2013) tend to expand and diversify in sectors that are strongly related to their current activities. Doing so, they claim that the patterns of diversification of countries can be explained mostly by the presence or lack of related sectors in the economy: developed countries are specialized in products strongly related to many other products and therefore enjoy higher diversification opportunities. However, the related diversification approach does not say much about the differences that the diversification process can display across countries (Boschma and Capone 2015; Petralia et al. 2015). More in particular, this literature has ignored the possible effect of (national) institutions on the intensity and nature of the diversification process.

The paper will bring together both streams of literature. What the VoC literature can learn from the related diversification literature is adopting a dynamic approach to industrial change. What the related diversification literature can learn from the VoC literature is a focus on the impact of institutions on the nature of the innovation process. We propose that institutions – and in particular coordination institutions that are the prime focus in the VoC approach – condition the direction of the diversification process, that is whether countries gain comparative advantage in new sectors that are more or less related to their current productive structure. More specifically, our hypothesis is that CME's diversify mostly in related sectors, while LME's have a higher probability to engage and succeed in less related diversification. Our analyses of the diversification process in 23 countries in the period 1995-2010 by means of product trade data confirm our hypothesis: relatedness is indeed a stronger driver of diversification into new products in countries with institutions associated to CME's,

while countries with institutions typical of LME's show a higher tendency to move in more unrelated industries.

The contribution of the paper is twofold. First, the paper introduces a dynamic element in the VoC literature by focusing on diversification rather than on specialization patterns in countries. In our approach, institutions determine the direction of diversification, that is whether new sectors are related more or less to the existing productive structure. Doing so, we use multiple institutional categories to measure the effect of institutions on diversification. Second, the paper introduces institutions in the literature on related diversification. While national and regional institutions have been recognized as important elements that influence the diversification process, so far their direct role in determining the direction of industrial diversification has been substantially neglected in empirical studies. In that sense, we also contribute to a wider debate that concerns the role of institutions in evolutionary economic geography (Boschma and Frenken, 2009; MacKinnon et al., 2009; Strambach, 2010; Crescenzi and Rodríguez-Pose, 2011; Menzel and Kammer, 2012).

The paper is organized as follows. First, we review the current debate on the VoC hypothesis and discuss the basic elements of the related diversification literature. In the empirical section, we provide some descriptive analysis of the data, and then we present the econometric analysis. We conclude by discussing the implications of our work.

2. Varieties of Capitalism and the nature of diversification

According to the VoC approach (Hall and Soskice, 2001), a firm must establish proper relations with other economic actors and solve coordination problems in five domains. The first domain is industrial relations: here the coordination problem is about the regulation of wages and working conditions. The second domain concerns corporate governance: firms interact with investors to ensure proper access to finance. In the product domain, firms have to deal with customers and competitors, in the inter-firm relations domain, firms must gain access to relevant inputs and technologies through other

firms, and in the training and education domain, firms must ensure that their incoming workforce acquire the necessary skills.

Hall and Soskice (2001) distinguish between two modes of coordination in the five domains. First, firms can use a market coordination mode, which is based on competitive, more fluid markets: information diffuse through the price system, and economic actors compete with each other and rely on extensive formal contracts. Alternatively, firms can use a strategic coordination mode, which is based on networks of relations: information diffuse through private networks, and economic actors collaborate with each other and accept incomplete contracts[1]. Institutional arrangements across domains are believed to cluster together, which are called institutional complementarities (Amable, 2000; Hall and Gingerich, 2009): countries adopting a market coordination mode in a domain tend to adopt the same mode also in other domains, and are referred to as Liberal Market Economies (LME's). Alternatively, countries adopting a strategic interaction mode in a domain, tend to adopt the same mode also in other domains, and are referred to as Coordinated Market Economies (CME's).

Due to the internal logic of each institutional system, Hall and Soskice (2001) argue that "… firms and other actors in coordinated market economies should be more willing to invest in specific and co-specific assets (i.e. assets that cannot readily be turned to another purpose and assets whose returns depend heavily on the active cooperation of others), while those in liberal market economies should invest more extensively in switchable assets (i.e. assets whose value can be realized if diverted to other purposes)" (p. 17). The dominant institutional arrangement has important implications for economic and innovation performance. Hall and Soskice (2001) claim that "the national institutional frameworks [...] provide nations with comparative advantages in particular activities and products. In the presence of trade, these advantages should give rise to cross-national patterns of specialization"

[1] To see how different can be these two coordination modes, consider the domain of corporate governance and the problem of getting access to finance. A market coordination mode requires firms to publicly disclose information to investors, and this information quickly translates into valuation changes in equity and bond markets, allowing all investors to monitor the performance of the companies. In a strategic coordination mode, firms are financed by investors that can monitor their performance through private sources of information to which they have access in virtue of their being major suppliers or clients, members of the same industry association, part of the supervisory boards. For further examples, see Hall and Soskice (2001).

(p. 38). They argue that this is true in particular in the innovation domain: LME's have a comparative advantage in radical innovations and a comparative disadvantage in incremental innovations. Conversely, CME's have a comparative advantage in incremental innovations and a comparative disadvantage in radical innovations[2].

As a simple test for their hypothesis, Hall and Soskice (2001) compared patents for Germany and the United States in 1983-84 and 1993-94, showing that Germany (a CME) specializes in technological classes with mostly incremental innovations while the US (a LME) specializes in technological classes with mostly radical innovations. Over time, more nuanced tests of the VoC Hypothesis have been devised. Allen et al. (2006) used international trade data rather than patent data, and found support for the VoC hypothesis. Taylor (2004) extended the analysis to more countries and more years, and relaxed the inherent link between a sector and the prevalent type of innovation, and found less supportive results. Akkermans et al. (2009) checked the validity of the hypothesis at the industry level and showed that it holds only for specific industries.

According to Hall and Soskice (2001), institutional frameworks have a direct impact on the sectors in which countries specialize and, as a consequence, on the type of innovations that occur in each country. The link between institutions and innovation is mediated by the sectoral specialization of countries and can be decomposed in two parts: first, an association between institutions and sectors, and second, an association between sectors and the type of innovations. This double step is, however, not straightforward. As noted by Herrmann and Peine (2011), the innovation strategy of firms does not depend only on the sector in which they operate, but also on the knowledge base of scientists and the characteristics of the national innovation system. The second association, which says that in some sectors mostly radical innovations occur, whereas in other sectors incremental innovations prevail, has led to intense debates. As pointed out by Taylor (2004) and Akkermans et al. (2009), this

[2] There are other institutional approaches that link institutions to the nature of the innovation process. In fact, there is a recurrent claim in the literature that some institutional frameworks are more responsive to radical change (see e.g. Ergas 1984; Hollingsworth 2009; Acemoglu et al 2014). This paper will concentrate on the VoC literature.

association has been challenged by the industry life cycle approach showing that radical innovations characterize the emergent phases of technologies and sectors, while incremental innovations emerge in their mature phases (Abernathy and Utterback, 1978; Klepper, 1996).

In this paper, we focus on the first association between specific institutions and stable patterns of industrial and technological specialization. The original contribution by Hall and Soskice (2001), where this association is stated very clearly, has been widely criticized for its overly static approach: inspired by game-theoretic analyses of the role and behaviour of firms, they put a strong emphasis on institutional complementarities and the resulting equilibrium in institutional frameworks that appeared almost immutable (Streeck and Thelen, 2005; Deeg and Jackson, 2007). Reactions to this critique have highlighted different forms and paths that institutional change can take, how institutional change occurs within the constraints of institutional complementarities (Hall, 2007; Hall and Thelen, 2009; Hancké et al., 2007; Strambach, 2010), and how institutional change is driven by a plurality of actors, like firms and other entrepreneurial actors, governments (Hall and Thelen, 2009), and marginalized or hegemonic social forces (Jessop, 2011). Most often, these actors stretch the limits of institutions to deal with challenges within a specific industrial sector or geographical location (Strambach, 2010). In this dynamic VoC framework, institutions and the related strategies at the firm level are seen "…. not as a set of [...] differences fixed over time, but as bundles of [...] practices that evolve along distinctive trajectories" (Hall, 2007, p. 40).

However, this shift of focus towards institutional change has not led to an interest in the evolution of industrial structures in the VoC literature: even in the dynamic version of the VoC framework, there is little room for industrial dynamics and change. Recently, a new stream of literature has investigated the evolution of the industrial structure of regions (Neffke et al., 2011; Boschma et al., 2013) and countries (Hausmann and Klinger, 2007). These studies show that territories are continuously experiencing the introduction of new technologies, products and sectors through a process of creative destruction (Schumpeter, 1939; Martin and Sunley, 2006; Boschma and Frenken, 2011; Essletzbichler, 2013). Technological relatedness acts as the main driver of this diversification

process, in which a new sector spawns from a related sector (Klepper and Simons, 2000) or from the recombination of capabilities from multiple, related sectors (Klepper, 2002). The related diversification theory also suggests the existence of cross-country differences: since relatedness drives the diversification process, developed countries with many related products enjoy higher diversification opportunities than underdeveloped countries (Hidalgo et al., 2007), and the effect of relatedness on diversification might not be the same in countries with different levels of economic development (Boschma and Capone, 2015; Petralia et al. 2015).

However, this related diversification theory has no clear implications about the existence of differences between different groups of countries at similar stages of development. Related to that, the related diversification literature has made no attempt to include institutions in empirical studies. While national and regional institutions have been recognized as important elements that influence the innovation process (Nelson, 1993; Feldman and Massard, 2002; Rodríguez-Pose and Di Cataldo, 2014), so far their direct role in determining the diversification process in general, and the direction of industrial diversification in particular has been neglected in empirical studies.

The VoC approach provides the opportunity to explicitly introduce institutional elements in the analysis of the diversification process. We propose that institutions determine the direction of the diversification process, that is whether new emerging sectors and technologies are more or less related to the existing productive structure of a country. In LME's, we expect a weaker effect of relatedness on product diversification, as they favor more mobile and switchable assets. Here firms can gain more easily access to credit on financial markets and by venture capitalists which favors the establishment of new enterprises in non-related fields. A less specialized and more mobile workforce reduces the costs of moving to new unrelated sectors. Market based inter-firm relations allow firms to enter distant fields by acquiring already established firms or by licensing new products. Weakly regulated product markets reduce the probability of legal obstacles to the introduction of new products as well as the necessity of gaining specific market knowledge.

In CME's we expect an opposite pattern, that is a stronger role of related diversification, because of the prevalence of specific and co-specific assets. This comes close to the claim of Menzel and Kammer (2012) that the formation of new industries is expected to be more tightly connected to established resources and industries in CME's. A specialized labor force can be more easily redeployed in closely related sectors. A financing system based on internal resources and consensus decision-making favors the choice of expanding into related rather than unrelated sectors. Inter-firm collaborations based on direct and repeated interactions favor the exchange of sector-specific information and the development of new related products. And heavily regulated product markets increase the value of legal knowledge in closely-related sectors and increase the costs of expanding in distant sectors.

Summarizing, our framework introduces dynamics in the VoC approach, by looking at the dynamic process of diversification rather than static specialization patterns in different institutional systems. And our approach introduces institutions in the related diversification literature, by looking at the impact of the overarching institutional framework on the nature of diversification, in terms of whether related rather than unrelated diversification prevails in countries.

3. Descriptive Analysis

In the previous section, we highlighted the strong association between institutional frameworks and the emergence and persistence of specific sectors, as proposed by VoC proponents. In this section, we test whether there is any evidence of such an association, by looking at the patterns of sectoral specialization and diversification of countries.

Such an analysis requires a dataset with specific features: it must be fine-grained in terms of product categories, it must allow cross-country comparisons, and it should guarantee an adequate time coverage. Two types of data satisfy these conditions in particular: patents and international trade data. In this paper, we employ international trade data over an extensive range of years: the NBER-UN database from 1970 to 2000 (Feenstra et al., 2005) and the BACI database from 1995 to 2010

(Gaulier and Zignago, 2010)[3]. There are good reasons to prefer trade data to patent data. Patents are a measure of invention rather than of innovation: it can be argued, instead, that successful innovation in sectors must reflect itself in the ability of countries to gain a comparative advantage in the production and the export of products (Berger, 2013). Empirical evidence consistently shows that in advanced countries, the innovative activity affects the dynamics of international trade market shares (Fagerberg, 1988; Dosi et al., 1990). Moreover, the advantage of using trade data is that renewal in the whole economy can be covered, while using patent data restricts the diversification process to high-tech industries only. Finally, and this is particularly relevant, the VoC arguments can be applied to the specialization and diversification patterns of the whole economy, and not only to the innovation domain.

A basic measure we compute from trade data is a revealed comparative advantage index for each country in each product category and in each year. A country has a comparative advantage in a product *i* ($x_{i,c,t} = 1$) when the share of this product in its exports is larger than the share of the product in the world exports (Balassa, 1965). The revealed comparative advantage is computed at the most detailed level of products available from current trade data, which is 4-digit for data from 1970 to 2000 (1,006 products) and 6-digit for data from 1995 to 2010 (5,018 products).

3.1 Specialization patterns of countries

To get a first impression of industrial change in countries, we look at the persistence of their specialization patterns in the period 1970-2010. We put each product category in our data[4] into one of three groups. These broad categories and their correspondence to SIC codes are taken from Akkermans et al. (2009): (1) products that should be characterized by radical innovation and should

[3] Both databases are based on United Nations official data. Full documentation about the data is available at the NBER website for the NBER-UN database and at the CEPII website for the BACI database.

[4] Official correspondence tables are used to link trade data codified by SITC (1962-2000) or HS (1995-2010) codes to 4-digit SIC codes. When a SITC or HS code is linked to more than one SIC code, we randomly assign it to one of the possible categories.

be mostly present in LME's (LM products). They include agriculture, food, electronics, aerospace, telecommunications, scientific instruments and biotechnology; (2) products that should be characterized by incremental innovation and should be mostly present in CME's (CM products). They include chemistry, drugs, machinery, electrical equipment, transportation and weapons; (3) all other products. Although other classifications of products and sectors are possible – for example, Pavitt's (1984) classification by technological levels or Leamer's (1984) classification by factor intensities – the broad categories identified by Akkermans et al. (2009) are particularly convenient because, on the basis of the assumptions of the VoC literature, they should be associated with specific groups of institutions and countries.

We consider four time periods (1971-1980; 1981-1990; 1991-2000; 2001-2010)[5]. For each period, we include a product category in the productive structure of a country if that country keeps a comparative advantage in the product for more than half of the period. Then, we compute the share of product categories in each of the three product groups (LM products, CM products, other products) and use it to build a specialization index in each of them. If a country has a share of product categories in a group larger than the share of all product categories in that group, the index takes positive values (between 0 and 1). Otherwise, it takes negative values (between 0 and -1). The presence of a third category makes sure that any relation between LM and CM specialization is possible. Figure 1 represents the specialization index in LM and CM products (on the horizontal and vertical axis respectively) for 23 developed countries to which Hall and Soskice (2001) refer (see Table A2 for a list of the countries). We use these countries to make our analysis directly comparable to Hall and Soskice (2001) work.

If the VoC hypothesis is correct, we should observe a graph with the following characteristics. First, there should be a negative relation between LM and CM specialization. Second, LME countries should cluster in the fourth quadrant and CME countries should cluster in the second quadrant, while

[5] We use the NBER-UN database for the first three periods and the BACI database for the fourth period.

the first and the third quadrant should be relatively empty. Third, this relation should be stable over time, because driven by the association between institutions and sectors.

During the seventies and the eighties, the first two requirements are satisfied. There is a negative relation between LM and CM specialization. Most LME countries (Australia, Canada, Ireland, New Zealand) are located in the fourth quadrant, while many CME countries (Austria, Belgium, Finland, Germany, Japan, Norway, Sweden, Switzerland) are located in the second quadrant or very close to it. The United States are the only country in the first quadrant. There are also some notable exceptions, though. Three CME countries (Denmark, Iceland, Netherlands) are in the fourth quadrant, while the UK is in the second quadrant.

In the following decades, the relation becomes weaker though. This dynamics is driven mostly by the movement of several countries from both the fourth quadrant (Denmark, Netherlands, Ireland) and the second quadrant (Belgium, France, Japan, Switzerland, UK) towards the first quadrant. This shift is at odds with the assumption of a strong association between national institutions and sectors. This still could simply reflect institutional change: countries changing institutions might also show changing specialization patterns. Schneider and Paunescu (2012) actually showed that in the 1990s, some countries (Denmark, Finland, Netherlands, Sweden, Switzerland) moved from a CME to a LME framework. In Figure 1, three of these countries moved towards the first quadrant. In the moving group, however, there are also countries with little institutional reforms, such as France or Ireland. More importantly, institutional change could explain only movements along the LM-CM relation curve, while in reality, we observe mostly movement towards the first quadrant, which reflects a weakening LM-CM relation.

Another possible explanation of this changing pattern refers to the industry life cycle approach (Klepper, 1996). If the characteristics of sectors change over time, involving a shift from radical innovations to incremental innovations, then the negative LM-CM relation might disappear simply

because of a misallocation of sectors in LM and CM categories[6]. While we think that the industry life cycle approach correctly identifies some limitations of the VoC approach, it cannot alone explain the pattern we observe in Figure 1. Given the empirical evidence regarding the industry life cycle, we would expect mostly sectors that should be under the CM label, but are wrongly allocated to the LM category. Therefore, the misallocation hypothesis implies that the weakening LM-CM relation is driven by the presence of CME countries in the first quadrant, while LME countries should not be affected by this. In the 2000s, we actually observe 5 countries in the first quadrant and 5 countries very close to it: four LME countries (Canada, Ireland, UK, US), two countries not classified in the two main groups (France, Spain), and four CME countries (Belgium, Denmark, Netherlands, Norway). Moreover, two of the CME countries (Denmark, Netherlands) actually exhibit an increase in CM (and not LM) specialization. Therefore, while we cannot exclude some misallocation of sectors in the LM and CM categories, this cannot alone explain the specialization patterns we observe.

3.2 Diversification patterns of countries

Besides specialization patterns of countries, we look at diversification patterns of countries over time. If the VoC literature is correct, we would expect LME's to diversify mostly in LM products, while CME's would diversify mostly in CM products.

We consider again the four periods. A country diversifies into a new product if that product is part of the productive structure in the current period, but not in the previous period[7]. A product is included in the productive structure of a country if that country keeps a comparative advantage in the product for more than half of that period. For each of the three product groups (LM, CM and other products), we computed the probability of diversification as the ratio between the number of product categories in which diversification occurred and the number of product categories in which

[6] We thank one anonimous reviewer for this observation.

[7] For the period 1971-1980, we use data from 1962 to 1970. For the period 2001-2010, we use data from 1995 to 2000.

diversification could have occurred. Finally, we built a diversification index in each of the groups by using the normalized ratio between the probability of diversifying in the group and the general diversification probability of the country. Positive values of the index (between 0 and 1) indicate a higher probability of diversification in the products belonging to the group.

The diversification index in LM and CM products is presented in Figure 2. It shows characteristics remarkably similar to those of the specialization index in Figure 1. In the 1970s and partially also in the 1980s, it is possible to identify two distinct clusters of countries. A first group (including Austria, Finland, Germany, Italy, Spain, Sweden, and Switzerland) diversifies mostly in CM products, not in LM products. A second group of countries (including Australia, Denmark, Ireland, New Zealand, Netherlands, Turkey, and United States) diversifies mostly in LM products and not in CM products. Over the 1980s, some countries (notably France, Japan and the UK) shift their diversification pattern from CM to LM products. Also in this case, the negative relation between LM and CM diversification disappears. In the last decade, almost all countries group around the first quadrant, showing strong diversification in both LM and CM products.

In sum, our findings on the dynamics of specialization and diversification patterns of countries challenge the strong assumption of the VoC literature of a stable association between institutions and sectors. Our finding of a changing LM-CM relation suggests that overarching institutional frameworks play little or no direct role anymore in the selection of the sectors in which countries diversify: it is not the case that LME's diversify mostly in LM products, while CME's diversify mostly in CM products. If so, the question remains whether institutions, as defined in the VoC framework, still matter in the process of diversification. We hypothesize that relatedness is a stronger driver of diversification into new products in CME's, as compared to LME's. To be more precise, we investigate whether CME countries diversify mostly into related products (and not necessarily CM products), and whether LME countries can make bigger jumps in their industrial evolution, and thus have a higher probability to move into more unrelated products (and not necessarily LM products).

4. Econometric Analysis

The descriptive analysis presented in the previous section showed strong dynamics in the specialization and diversification patterns of countries, in contrast with the assumptions of the VoC approach. The related diversification theory offers an alternative perspective to explain such patterns, based on the idea that countries diversify into related sectors, but this theory is quite silent about differences in the diversification process across countries or any role that institutions might play in it. In the theoretical section, we proposed that relatedness is a stronger driver of diversification into new products in CME's, as compared to LME's. In this section, we empirically investigate whether CME countries diversify mostly into related products (and not necessarily CM products), and whether LME countries diverisfy mostly into unrelated products (and not necessarily LM products).

Our empirical analysis of diversification based on relatedness requires two basic measures. First, we need a metric to determine how similar products are. Second, we need to measure the distance of countries to products, in order to observe whether their productive structure changes towards related or unrelated products. These two elements are provided by the methodological toolkit developed by a set of quantitative studies applying network analysis to the study of related diversification (Hausmann and Klinger, 2007; Hidalgo et al., 2007; Hidalgo and Hausmann, 2009).

The first element is the concept of proximity between two products. The proximity (ϕ) between two products (*i* and *j*) in a given year *t* can be formally expressed as:

$$\varphi_{ijt} = min\{P(x_{i,t}|x_{j,t}), P(x_{j,t}|x_{i,t})\} \qquad (1)$$

which says that the proximity between product *i* and *j* in year *t* is the minimum between the conditional probability of having a revealed comparative advantage in product *i* given a revealed comparative advantage in product *j*, and the conditional probability of having a revealed comparative advantage in product *j* given a revealed comparative advantage in product *i*. The rationale behind the proximity measure is that if two products are related because they require similar institutions,

infrastructure, productive inputs, capabilities, and technology, they will be more likely to be produced together. Conditional probabilities rather than joint probabilities are used, so that the measure is not affected by the relevance of the products in the world trade. The minimum between conditional probabilities is used in order to ensure a symmetric and conservative measure.

The second element is a density indicator that measures how close a product is to the current productive structure of a country. Formally, density can be expressed as follows:

$$d_{i,c,t} = \frac{\sum_k x_{k,c,t} \cdot \varphi_{i,k,t}}{\sum_k \varphi_{i,k,t}} \qquad (2)$$

where ϕ represents proximity (between product *i* and product *k*) and *x* takes the value of 1 if country *c* has a comparative advantage in product *k* at time *t*, and zero otherwise. So, density around a product will be high if a country has a comparative advantage in most of the products related to the focal one. At the extreme, it will be equal to 1, if a country has a comparative advantage in all products with a non-zero proximity to the focal product. Conversely, density around a product will be low (zero) if a country does not have a comparative advantage in most (any) of the products related to the focal one.

The proximity and density indicators are computed using country-level world trade data from the BACI database for the period 1995-2010 (Gaulier and Zignago, 2010)[8]. We use 4-digit level data which includes 1,241 different products[9]. Summary statistics and correlations on comparative advantage and density, as well for all other variables in our analysis, are provided in Table A1.

Following previous studies on related diversification (Hausmann and Klinger, 2007; Boschma et al., 2013), we study the probability of gaining a comparative advantage in a given sector as a function of a comparative advantage in the past in the same sector and the density indicator. To better capture

[8] We limit our analysis to this period, because most of the institutional indicators developed within the Varieties of Capitalism literature refer to the early 1990s.

[9] We use 4-digit rather than 6-digit data because the computation of conditional probabilities is highly demanding for computer memory. However, our analysis is still more fine-grained than what can be found in other studies: Hausmann and Klinger (2007) use a specification with 1,006 products, while Boschma et al. (2013) have 775 products.

the effect of density on the entry into new sectors, we separate it from the effect of density on the retention of current sectors, by interacting density with dummy variables indicating whether a country had already a comparative advantage in the product or not.

Since high density indicates low distance of a product to the productive structure of a country, a positive effect of density is evidence that countries diversify into related products. Our hypothesis about VoC institutions is that the institutional characteristics of countries strengthen or reduce the impact of related diversification. Therefore, the impact of density should differ across countries according to their institutional characteristics. A test for this hypothesis can be obtained by interacting the density measure with an institutional indicator: a positive sign of the interaction term indicates a stronger effect of density in presence of the considered institutions, while a negative sign indicates a weaker effect of density. Obviously, a non-significant effect is also possible, signaling the existence of no difference in the effect of density across countries. In our analysis, we use multiple institutional indicators: their summary statistics and correlations are provided in Table A1, while a short description and reference to the data sources are provided in Table A2. The direct effect of institutional characteristics – both at the national and the sectoral level – on comparative advantage is taken into account by including country-year and product-year fixed effects.

Formally, we estimate the following econometric model:

$$x_{i,c,t+5} = \alpha + \beta_0 \cdot x_{i,c,t} + \beta^m \cdot x_{i,c,t} \cdot d_{i,c,t} + \beta^n \cdot \left(1 - x_{i,c,t}\right) \cdot d_{i,c,t} + \\ + \gamma^m \cdot Inst \cdot x_{i,c,t} \cdot d_{i,c,t} + \gamma^n \cdot Inst \cdot \left(1 - x_{i,c,t}\right) \cdot d_{i,c,t} + \\ + \delta_1 \cdot l_i \cdot d_{i,c,t} + \delta_2 \cdot c_i \cdot d_{i,c,t} + \pi X + \varepsilon_{i,c,t} \quad (3)$$

where the dependent variable takes value 1 if country *c* has a comparative advantage in product *i* at time *t* + 5 and zero otherwise[10], $d_{i,c,t}$ denotes the density[11] around product i in country c at time t, *Inst*

[10] We follow past studies that use a 5-years time lag.

[11] Density is normalized by subtracting the mean and dividing by the standard deviation.

is the institutional indicator measured in the specific context, and *X* is a vector of country-year and product-year dummy variables, which control for any time-varying country or product characteristics. Since we estimate separately the effect of density on gaining a comparative advantage (β^n) and on retaining a comparative advantage (β^m), we focus attention on the coefficients γ^m and γ^n, that capture any difference in the impact of density on having a comparative advantage in current and new products, depending on the level of the institutional indicator.

As mentioned in the previous section, an alternative driver of diversification could be the association between institutions, sectors and types of innovation, as assumed by the VoC literature. Adapting this assumption to the context of related diversification, if a stronger or weaker role of density is related to specific types of products, and in particular to product categories associated with LME and CME, we might attribute to institutions an effect that is actually driven by product characteristics and country product specialization. To control for this effect, we include in our regression model an interaction between density and product categories, distinguishing between products typically associated to LME (l_i) and products typically associated to CME (c_i), as before.

We estimate our model by using OLS with standard errors clustered at the country level. We use OLS rather than limited dependent variable estimators because of the incidental parameters problem rising in presence of a large number of dummy regressors (Heckman, 1981; Greene, 2004). In these conditions, a linear probability model is more advisable because non-linear models produce biased and inconsistent estimates of all parameters, whereas average effects obtained from the linear model are quite similar to marginal effects from non-linear models (Angrist and Pischke, 2009; Riedl and Geishecker, 2014). Further complications arise in non-linear models because the computation of marginal effects depends on distributional assumptions about the unobserved heterogeneity captured by fixed effects, because results are quite sensitive to misspecification errors, and there is no straightforward interpretation of interaction terms. The presence of the lagged dependent variable with fixed effects could generate a severe dynamic panel bias. However, this is not the case in our

analyses, since the fixed effects are computed for each time period, exploiting the variation in the country and product dimensions.

4.1 Results: Dummy institutional indicators

The first and most simple indicator we use to test our hypothesis is the classification of countries in the three categories of Liberal Market Economies (LME), Coordinated Market Economies (CME) and Mixed Market Economies (MME), provided by Hall and Soskice (2001)[12]. We would expect to find a negative effect of the interaction variable between density and institutions for LME's, a positive effect for CME's, and no effect for MME's.

Table 1 reports the results of our regressions. As expected, density has a positive effect both on keeping a comparative advantage in current products and on developing a comparative advantage in new products. The variables controlling for the VoC hypothesis have no significant effect. The interaction coefficients between density and institutional indicators have the expected signs, and are bigger in the case of new products, but they are far from being statistically significant. One possible reason for this result is that institutions actually changed over time, especially during the period under analysis. Schneider and Paunescu (2012) provided detailed evidence about such changes and built a more refined taxonomy of institutional varieties, employing 5 categories (instead of 3), and allowing countries to change category over the years[13]. We considered this detailed taxonomy in the models reported in Table 2, but again we did not find the expected results: the interaction coefficients were never significant.

4.2 Results: Corporate governance and labor indicators

[12] Hall and Soskice (2001) consider 23 countries and we use the same countries in our analysis. See Table A2 for a list of the countries.

[13] Schneider and Paunescu (2012) add Czech Republic, Hungary, Poland, and South Korea to the 23 Hall and Soskice (2001) countries, but exclude Iceland. We run our analysis including also Iceland and we classify it into CME's (as in the previous case). Results are not affected by the inclusion or exclusion of Iceland.

The use of predefined categories, where countries are forced to belong to one of the "ideal type" groups without any quantitative measurement of institutional variables, has been criticized in the VoC literature, because it is too coarse as a measure for institutional variation (Geffen and Kenyon, 2006). The debate about how to measure institutions extends well beyond the VoC approach. An extreme view considers only objective rules as acceptable institutional measures (Glaeser et al., 2004), but this leaves out the analysis of informal rules or the actual enforcement of formal rules that might have more impact on economic and social outcomes (Woodruff, 2006; Parker and Kirkpatrick, 2012). In the case of broad institutions, which are theoretically meaningful but not directly observable, Voigt (2013) has suggested the use of factor analysis over observable variables. Using such approach, Hall and Gingerich (2009) has provided detailed indicators for 20 countries for what are considered the two most important institutional domains in the VoC approach, since they directly impact on the supply of labor and capital: labor relations and corporate governance relations. Both indicators are normalized to be between 0 and 1, and take higher values in presence of strategic coordination mechanisms and lower values in presence of market coordination mechanisms[14].

The debate about how to measure institutions has important implications also for the selection of the countries to analyze. There is actually a trade-off to consider in selecting the countries for our analysis. On the one hand, increasing the number of countries might improve the robustness of the analysis: the lower the number of the countries, the higher the impact that each country (and its specificities) has on the results. In our econometric analysis we try to account for the impact of country specific characteristics by using country-year fixed effects and country-clustered standard errors: this mitigates the issue, but it does not solve it completely. On the other hand, increasing the number of countries comes at a cost: institutional indicators available for a higher number of countries

[14] For the value of the indicators for each country, see Hall and Gingerich (2009), Table 2, p. 458. The variables employed in the factor analysis are: shareholder power, dispersion of control, size of stock market, level of wage coordination, degree of wage of coordination, labour turnover. Details and sources about these variables can be found in Hall and Gingerich (2009), p. 455.

are in general less precise and based mostly on formal, objective rules[15]. Formal rules might fail in capturing the actual incentives that institutions generate and might be even deceiving if they act as a substitute of effectiveness[16].

In the models reported in Table 3, we consider the two indicators developed by Hall and Gingerich (2009) as our institutional variables and we limit our analysis to the countries for which these indicators are available[17]. We consider each of them separately (model 1 to 4), and then the combination of a summary indicator obtained from principal component analysis (model 5 and 6). We avoid the inclusion of both variables in the same regression because of their high correlation leading to multi-collinearity issues. In each case, we consider both the continuous indicator and a dummy variable that splits the countries in two groups around the median. While the first method captures the existence of a linear effect of our institutional variables, the second method is useful to detect the existence of non-linear effects. For example, some institutions might generate an effect only above or below a certain threshold. Moreover, this second method allows an easier interpretation of the coefficient, that indicates the difference in the effect of density across the two groups of countries.

In all cases, we obtain positive and significant coefficients for the interaction between institutional indicators and density in new sectors. Since higher values of the institutional indexes indicate non-market coordination in the labor and corporate governance domains, these results support our hypothesis. In terms of size, the effect is also relevant: moving from the group below the median to the group above the median implies an impact of density on the development of comparative advantage into new products that is 26% stronger in the case of labor relations, 16%

[15] By formal, objective rules we refer to *de jure* institutions, as formally specified in legislation and distinct from how they are factually implemented. As Glaeser et al. (2004) put it, "it is certain that 'rules on the books' are very different from what actually takes place in a country" (p. 276).

[16] That is, we might observe stricter regulations in countries where enforcement is weaker, or some rules might be explicitly stated in countries where citizens are less inclined to follow them. For example, formal vocational training in the school system might be stronger in countries where firms do not provide it to their workes.

[17] For an analysis of institutions and diversification using a different set of institutions and a larger set of countries, see Boschma and Capone (2014).

stronger in the case of corporate governance relations, and 32% stronger in the case of our combined indicator[18].

4.3 Robustness checks: Further institutional indicators

Apart from labor relations and corporate governance relations, there are also other relevant institutional domains that may be more or less effective in driving related diversification: product market regulation, inter-firm regulations, and training systems. The use of indicators referring to these institutional domains allows us to perform a robustness test of our hypothesis, because we can extend the analysis to some institutional aspects that are theoretically relevant in the VoC framework, and because these additional institutional measures are derived from other data sources.

As an indicator of product market regulation, we consider an index (PMR) constructed by Nicoletti et al. (2000), which is a summary measure of 17 product market regulation in 1998. Higher values indicate stronger market regulation that increases the costs of entering new unrelated markets.

For the inter-firm relations domain, we consider two measures. First, we use an indicator of mergers and acquisition (MA), expressed as the ratio between the sum of M&As in a country and its population between 1990 and 1997 (Pagano and Volpin, 2001). Higher values of M&A in a country indicate the prevalence of market mechanisms in the realm of inter-firm relations. However, M&As capture only a specific segment of the inter-firm relations. Therefore, we also use an index of firm cooperation (FCO) developed by Hicks and Kenworthy (1998). This is a summary measure of multiple indicators of firm collaboration between 1960 and 1989 which is available for 18 countries. Higher values of this indicator imply the use of more cooperative practices adopted by the firms in their relations.

[18] Recall that β^n measures the effect of density on gaining a comparative advantage in a new product and γ^n captures the difference (if any) in the impact of density on gaining a comparative advantage in a new product depending on the level of the institutional indicator. When we use the dummy structure for the institutional indicator, γ^n captures the additional effect of density on gaining a comparative advantage in a new product that is experienced by countries belonging to the group with a high value of the institutional indicator. In this case, the relative size of the effect can be computed as the ratio between γ^n and β^n.

Finally, we include an indicator of characteristics of the training system (VCT), which is given by the ratio between students enrolled in vocational training program at the secondary and tertiary level, and all students enrolled in the same cohorts. A higher share of vocational training creates a future workforce more specialized in the current production of a country.

We estimate separately a model for each indicator due to the high correlation between them, using the same countries as in the previous section[19]. In Table 4, we present results from the estimation of Equation (3). Most results are in line with our expectations. Again, the institutional effect is concentrated mostly on the entry into new products, although we find a positive effect in current products in the case of product market regulations. The effect of density is stronger in presence of tighter product market regulations (Models 1 and 2) and more cooperative firm practices (Model 5 and 6), and it is weaker when inter-firm collaborations are performed mostly through competitive M&As (Model 3) The negative sign of the M&A indicator is coherent with our hypothesis, since higher values of the M&A indicator reveal the presence of market coordination mechanisms. We found a negative and significant effect of vocational training (Model 7) which goes against our expectations, but this effect is not robust to a different specification (Model 8). This result might signal the weakness of our indicator of vocational training, which does not capture the role played by firms in the development of the workforce skills (Gospel, 2013). The difference between the groups below and above the median is significant in the case of stronger product market regulation (a 22% increase in the effect of density) and stronger firm cooperation (a 27% increase in the effect of density). The values are within the range of those holding for labor relations and corporate governance relations.

5. Conclusions

[19] With the exception of the firm cooperation index, which is not available for Spain and Portugal.

This paper has demonstrated that institutions have an impact on the direction of diversification in developed countries by investigating their ability to gain comparative advantage in new sectors that are close or far from what they already produce. While inspired by the VoC literature, we moved beyond the coarse distinction between LME and CME countries, and we used multiple institutional indicators. Our results showed that the role of relatedness as a driver of diversification into new sectors is stronger in presence of 'non-market' coordination institutions in the domains of labor relations, corporate governance relations, product market relations, and inter-firm relations.

We contribute to the VoC literature by showing that institutions condition the direction of diversification, and not specialization patterns in countries. We demonstrated that countries with institutions associated to CME's diversify into related products, not CM products, while countries with institutions typical of LME's had a higher probability to move into more unrelated products, not LM products. A recent paper by Mindruta et al. (2014) shows that a similar evolutionary process takes place in the domain of patents, and that coordination institutions determine cross-country differences in explorative and exploitative innovation.

The paper also contributes to the literature on related diversification, by explicitly introducing institutional elements. Our study confirms the strong path-dependence in the diversification process of countries emerging from previous work (Hausmann and Klinger, 2007; Boschma et al., 2013): the productive structure of the past keeps exerting its influence many years later. But on top of that, we could show that institutions matter for the type of diversification that occurs in countries, in terms of whether related rather than unrelated diversification prevails. Our paper provides an example of how institutions can be successfully integrated in evolutionary economic geography more in general, and in the literature on related diversification more in particular.

There are obviously some aspects that we did not consider in this work and that are open for further research. First, it would be important to study the extent to which some institutions might be relevant only for some specific sectors, distinguishing high-tech from low-tech, for example, as suggested by the literature on sectoral systems of innovation (Malerba, 2004). The presence of

sectoral institutions could actually be a driver for the emergence and success of some sectors. Second, we investigated the role of national institutions on the nature of diversification in countries. Boschma et al. (2013) actually showed that the effect of relatedness on diversification is stronger at the regional than at the national level, whereas regional institutions might exhibit higher variety and more dynamics than national institutions (Strambach, 2010). Therefore, it would be even more interesting to do the same type of analysis at the regional level (effect of regional institutions on regional diversification), or even better, to take a multi-scalar approach that assess the role of national and regional institutions on the diversification process in regions (Peck and Theodore, 2007). Another interesting aspect to investigate is the effect of institutional complementarities, with some sets of institutions that become relevant only when also other elements are present (Amable, 2000; Lipsey, 2009). For instance, we know that institutional change has a limited effect if it does not change the nature of the complementarities (Hancké et al., 2007). Finally, an important issue to consider is the effect of institutional change on diversification, such as the tendency of market economies to become more market-oriented (Hall and Thelen, 2009) or to increase the importance of financial markets and values (Gospel et al., 2014). Studies on abrupt institutional change like the erosion of property rights or the transformation of a political system could also be relevant in this respect, as these could have long-lasting consequences on the process of industrial diversification in countries.

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Table 1

Determinants of Having a Comparative Advantage in the Future: Dummy Indicators of Varieties of Capitalism

Institutions Indicator	Original Dummy (Hall and Soskice, 2001)		
Indicator Measurement	LME	CME	MME
	(1)	(2)	(3)
Model	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+5}	CA_{t+5}
CA_t	0.654**	0.653**	0.653**
	(0.011)	(0.0109)	(0.0111)
Density on Current	0.148**	0.145**	0.146**
	(0.0117)	(0.0123)	(0.011)
Density on New	0.145**	0.136**	0.143**
	(0.0097)	(0.0095)	(0.0075)
LME * Density on Curr.	-0.01		
	(0.0165)		
LME * Density on New	-0.16		
	(0.0145)		
CME * Density on Curr.		0.005	
		(0.0139)	
CME * Density on New		0.015	
		(0.0129)	
MME * Density on Curr.			0.004
			(0.0152)
MME * Density on New			-0.002
			(0.0174)
LM Product * Density	0.001	0.001	0.001
	(0.0059)	(0.0058)	(0.0056)
CM Product * Density	0.002	0.002	0.002
	(0.0033)	(0.0033)	(0.0032)
Observations	85629	85629	85629
Number of Clusters	23	23	23
Adjusted R-squared	0.6241	0.6241	0.6241

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
**,*,+ statistically significant at .01, .05 and .10 percent respectively.

Table 2

Determinants of Having a Comparative Advantage in the Future: Time-Varying Dummy Indicators of Varieties of Capitalism

Institutions Indicator	Time-Varying Dummy (Schneider and Paunescu, 2012)				
Indicator Measurement	LME^{+}	LMEE	HYB	CMEE	CME^{+}
	(4)	(5)	(6)	(7)	(8)
Model	LPM	LPM	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}
CA_t	0.643**	0.643**	0.642**	0.643**	0.643**
	(0.0112)	(0.0114)	(0.011)	(0.0116)	(0.0110)
Density on Current	0.138**	0.136**	0.141**	0.136**	0.141**
	(0.0106)	(0.0107)	(0.0116)	(0.0111)	(0.0101)
Density on New	0.138**	0.137**	0.137**	0.133**	0.136**
	(0.0092)	(0.0091)	(0.0099)	(0.01)	(0.0095)
LME^{+} * Density on Curr.	0.001				
	(0.0163)				
LME^{+} * Density on New	-0.009				
	(0.0177)				
LMEE * Density on Curr.		0.007			
		(0.0146)			
LMEE * Density on New		-0.004			
		(0.0137)			
HYB * Density on Curr.			-0.018		
			(0.0232)		
HYB * Density on New			-0.006		
			(0.0197)		
CMEE * Density on Curr.				0.004	
				(0.0126)	
CMEE * Density on New				0.007	
				(0.0119)	
CME^{+} * Density on Curr.					-0.006
					(0.0122)
CME^{+} * Density on New					-0.002
					(0.0128)
LM Product * Density	0.002	0.001	0.002	0.002	0.002
	(0.0057)	(0.0057)	(0.0056)	(0.0056)	(0.0056)
CM Product * Density	0.003	0.003	0.003	0.003	0.004
	(0.003)	(0.003)	(0.003)	(0.0031)	(0.0031)
Observations	100521	100521	100521	100521	100521
Number of Clusters	27	27	27	27	27
Adjusted R-squared	0.6032	0.6032	0.6033	0.6032	0.6032

Country-clustered standard errors in parentheses.
All models include country-year and product-year dummy variables.
$^{**,*,+}$ statistically significant at .01, .05 and .10 percent respectively.

Table 3

Determinants of Having a Comparative Advantage in the Future: Labor and Corporate Governance Indicators

Institutions Indicator	Labor Relation Index (Hall & Gingerich, 2009)		Corp. Gov. Index (Hall & Gingerich, 2009)		PCA Combination LRI and CGI	
Indicator Measurement	Cts	Med	Cts	Med	Cts	Med
	(1)	(2)	(3)	(4)	(5)	(6)
Model	LPM	LPM	LPM	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}
CA_t	0.659**	0.659**	0.659**	0.662**	0.659**	0.661**
	(0.0113)	(0.011)	(0.0113)	(0.0115)	(0.0114)	(0.0103)
Density on Current	0.131**	0.134**	0.126**	0.139**	0.128**	0.138**
	(0.0139)	(0.0111)	(0.0126)	(0.0159)	(0.0134)	(0.0126)
Density on New	0.119**	0.123**	0.116**	0.128**	0.116**	0.118**
	(0.0122)	(0.0112)	(0.0132)	(0.0099)	(0.0133)	(0.0085)
LRI*Density on Curr.	0.017	0.012				
	(0.0209)	(0.0132)				
LRI*Density on New	0.039*	0.032*				
	(0.0172)	(0.012)				
CGI*Density on Curr.			0.022+	0.002		
			(0.02)	(0.0174)		
CGI*Density on New			0.039*	0.021+		
			(0.0195)	(0.012)		
LGI*Density on Curr.					0.021	0.005
					(0.0211)	(0.0144)
LGI*Density on New					0.041*	0.038**
					(0.0194)	(0.0109)
LM Product * Density	0.0004	0.0002	0.001	0.0003	0.001	-0.0003
	(0.0066)	(0.0066)	(0.0065)	(0.0066)	(0.0065)	(0.0066)
CM Product * Density	0.002	0.002	0.002	0.002	0.002	0.002
	(0.0038)	(0.0038)	(0.0038)	(0.0037)	(0.0038)	(0.0038)
Observations	74460	74460	74460	74460	74460	74460
Number of Clusters	20	20	20	20	20	20
Adjusted R-squared	0.6332	0.6332	0.6331	0.6332	0.6332	0.6333

Country-clustered standard errors in parentheses.

All models include country-year and product-year dummy variables.

**,*,+ statistically significant at .01, .05 and .10 percent respectively.

Table 4

Determinants of Having a Comparative Advantage in the Future: Further Institutional Indicators

Institutions Indicator	PMR		MA		FCO		VCT	
Indicator Measurement	Cts	Med	Cts	Med	Cts	Med	Cts	Med
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Model	LPM	LPM	LPM	LPM	LPM	LPM	LPM	LPM
D.V.	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}	CA_{t+5}
CA_t	0.657**	0.657**	0.66**	0.659**	0.665**	0.664**	0.656**	0.656**
	(0.0106)	(0.0108)	(0.0127)	(0.0133)	(0.0113)	(0.0115)	(0.0106)	(0.0107)
Density on Current	0.095**	0.131**	0.152**	0.143**	0.131**	0.137**	0.14**	0.147**
	(0.0204)	(0.0108)	(0.0187)	(0.0146)	(0.0135)	(0.0126)	(0.0136)	(0.0154)
Density on New	0.09**	0.127**	0.157**	0.146**	0.121**	0.125**	0.179**	0.154**
	(0.0214)	(0.0068)	(0.0095)	(0.0092)	(0.008)	(0.008)	(0.0184)	(0.0113)
PMR*Density on Curr.	0.032*	0.024+						
	(0.0144)	(0.0132)						
PMR *Density on New	0.036*	0.028*						
	(0.0162)	(0.0129)						
MA*Density on Curr.			-0.001	-0.007				
			(0.0008)	(0.0148)				
MA*Density on New			-0.001*	-0.013				
			(0.0005)	(0.0159)				
FCO*Density on Curr.					0.034	0.015		
					(0.0341)	(0.0183)		
FCO *Density on New					0.063**	0.034**		
					(0.017)	(0.0122)		
VCT*Density on Curr.							0.006	-0.009
							(0.0182)	(0.0165)
VCT *Density on New							-0.09*	-0.023
							(0.0361)	(0.0151)
LM Product * Density	0.001	0.001	0.001	0.001	0.0002	0.0002	0.001	0.001
	(0.0064)	(0.0064)	(0.0063)	(0.0063)	(0.0074)	(0.0073)	(0.0065)	(0.0065)
CM Product * Density	0.002	0.003	0.002	0.002	0.001	0.001	0.002	0.002
	(0.0037)	(0.0037)	(0.0038)	(0.0038)	(0.0039)	(0.0039)	(0.0037)	(0.0036)
Observations	74460	74460	74460	74460	67014	67014	74460	74460
Number of Clusters	20	20	20	20	18	18	20	20
Adjusted R-squared	0.6332	0.6332	0.6332	0.631	0.6465	0.6465	0.6332	0.6332

Country-clustered standard errors in parentheses.

All models include country-year and product-year dummy variables.

**,*,+ statistically significant at .01, .05 and .10 percent respectively.

Table A1

Summary Statistics and Correlations

Variable	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
CA_{t+5} (1)	0.279	0.4484	1																			
CA_t (2)	0.276	0.4471	0.752	1																		
Density (3)	0.298	0.124	0.423	0.462	1																	
LM Product (4)	0.238	0.4257	-0.033	-0.024	-0.016	1																
CM Product (5)	0.24	0.4272	0.034	0.04	0.029	-0.314	1															
LME (6)	0.261	0.4391	-0.06	-0.045	-0.207	0	0	1														
CME (7)	0.478	0.4995	-0.031	-0.023	-0.069	0	0	0.569	1													
MME (8)	0.261	0.4391	0.096	0.071	0.285	0	0	-0.353	-0.569	1												
LME^+ (9)	0.259	0.4382	-0.028	-0.021	-0.114	0	0	0.683	-0.255	-0.393	1											
LMEE (10)	0.383	0.4861	-0.047	-0.037	-0.172	0	0	0.658	-0.165	-0.47	0.751	1										
HYB (11)	0.234	0.3981	-0.029	-0.025	-0.094	0	0	-0.183	0.219	-0.066	-0.294	-0.391	1									
CMEE (12)	0.383	0.4861	0.109	0.095	0.402	0	0	-0.506	-0.051	0.564	-0.466	-0.62	-0.391	1								
CME^+ (13)	0.247	0.4312	0.105	0.107	0.457	0	0	-0.353	0.29	0.023	-0.339	-0.451	-0.284	0.727	1							
LRI (14)	0.517	0.2951	0.051	0.041	0.205	0	0	-0.854	0.625	0.197	-0.69	-0.719	0.398	0.494	0.48	1						
CGI (15)	0.616	0.2829	0.081	0.066	0.31	0	0	-0.862	0.449	0.427	-0.743	-0.749	0.183	0.657	0.567	0.912	1					
PCA (16)	0.567	0.2824	0.067	0.055	0.264	0	0	-0.878	0.549	0.319	-0.733	-0.751	0.297	0.589	0.536	0.978	0.978	1				
PMR (17)	1.49	0.4482	0.049	0.034	0.16	0	0	-0.716	0.268	0.485	-0.529	-0.595	0.28	0.438	0.396	0.571	0.642	0.62	1			
MA (18)	16.31	9.331	-0.12	-0.1	-0.432	0	0	0.627	-0.116	-0.573	0.581	0.686	0.256	-0.548	-0.344	-0.678	-0.725	-0.717	-0.467	1		
FCO (19)	0.218	0.2312	0.023	0.011	0.062	0	0	-0.632	0.593	0.01	-0.489	-0.548	0.67	0.131	0.131	0.746	0.537	0.656	0.416	-0.594	1	
VCT (20)	0.435	0.1701	0.007	0.019	0.09	0	0	-0.3	0.467	-0.24	-0.116	-0.096	0.948	0.158	0.323	0.212	0.264	0.243	0.109	-0.224	0.086	1

Table A2

Descriptions of Institutional Indicators

SHORT NAME	INDICATOR NAME	DESCRIPTION	SOURCE
LME	Liberal Market Economies	Includes: Australia, Canada, Ireland, New Zealand, UK, USA.	Hall and Soskice, 2001
CME	Coordinated Market Economies	Includes: Austria, Belgium, Denmark, Finland, Iceland, Germany, Japan, Netherlands, Norway, Sweden, Switzerland.	Hall and Soskice, 2001
MME	Mixed Market Economies	Includes: France, Greece, Italy, Portugal, Spain, Turkey.	Hall and Soskice, 2001
LME^{+}	Liberal Market Economies (SP)	Includes: Canada, UK, USA (1995, 1999, 2005); Australia, New Zealand (1995, 1999); Ireland (1999); Denmark (1995, 2005); Switzerland (1999, 2005); Finland, Netherlands (1999).	Schneider and Paunescu, 2012
LMEE	LME^{+} and LME-Like Economies	Includes: LME^{+}; Australia, New Zealand (2005); Ireland (1995, 2005); Switzerland (1995); Denmark (1999); Sweden (1999, 2005); Finland, Netherlands (2005); Spain (2005).	Schneider and Paunescu, 2012
HYB	Hybrid Economies	Includes: Hungary, Japan, Korea, Poland (1995, 1999, 2005); Norway (1999, 2005); Czech Republic, Italy (2005).	Schneider and Paunescu, 2012
CME^{+}	Coordinated Market Economies (SP)	Includes: Austria, Belgium, France, Germany (1995, 1999, 2005); Czech Republic, Italy (1995, 1999); Finland, Netherlands, Norway, Sweden (1995).	Schneider and Paunescu, 2012
CMEE	CME* and State-Dominated Economies	Includes: CME^{+}; Greece, Portugal, Turkey (1995, 1999, 2005); Spain (1995, 1999).	Schneider and Paunescu, 2012
LRI	Labor Relation Index	Index obtained by applying factor analysis to labor relations indicators.	Hall and Gingerich, 2009
CGI	Corporate Governance Index	Index obtained by applying factor analysis to corporate governance indicators.	Hall and Gingerich, 2009
LGI	Combined Index of Labor Relations and Corporate Governance	Principal component combination of Labor Relations Index and Corporate Governance Index.	Based on LRI and CGI
PMR	Product Market Regulation	Summary measure of 17 product market regulation indicators in 1998.	Nicoletti et al., 2000
MA	Mergers and Acquisitions	Ratio of M&A deals and total population (in millions), average between 1990 and 1997.	Pagano and Volpin, 2001
FCO	Firm Cooperation	Summary measure of firm-level cooperation, average between 1960-1989.	Hicks and Kenworthy, 1998
VCT	Vocational Training	Sum of the share of students enrolled in secondary vocational programs over all students enrolled in secondary programs and the share of students enrolled in tertiary vocational programs over all students enrolled in tertiary programs, average 1990-1994.	UNESCO Institute for Statistics

Figure 1

Specialization Patterns in Liberal Market (LM) and Coordinated Market (CM) Products

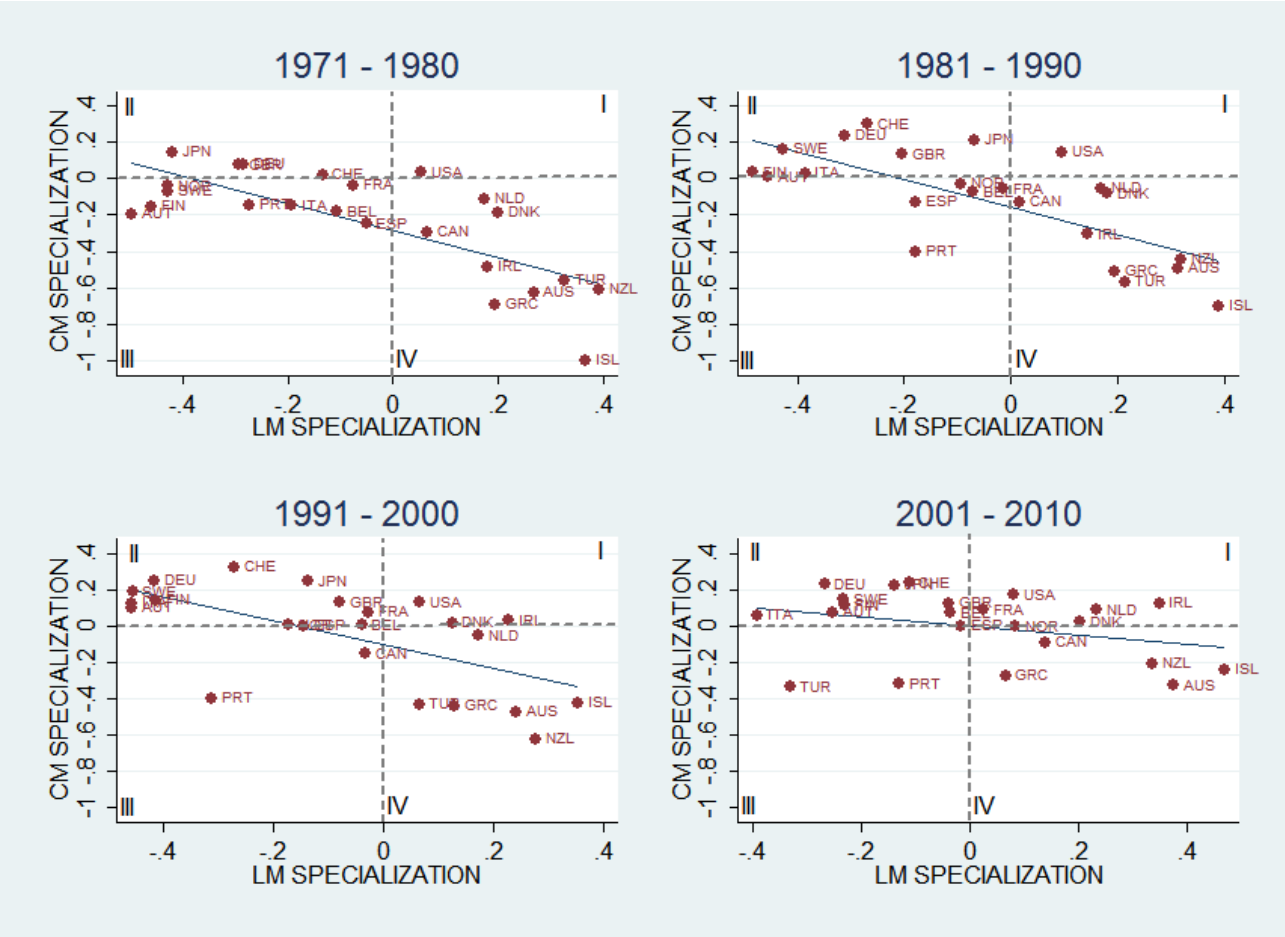

Figure 2

Diversification Patterns in Liberal Market (LM) and Coordinated Market (CM) Products